Dr. Linton Wells II, Acting Assistant Secretary of Defense for Command, Control, Communications and Intelligence

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1. Introduction

Thank you, Mr. Chairman, and members of the subcommittee, for inviting me to speak on this issue of the utmost importance to our military forces, allocating radio frequency (RF) spectrum. As the Acting Assistant Secretary of Defense for Command, Control, Communications and Intelligence, I am responsible for spectrum policy and management within the Department of Defense.

The United States has global security responsibilities and thus has needs for spectrum for military systems that are far greater than any other nation's requirements. This is part of the benefits and burdens that accrue to our Nation, given our worldwide leadership role in the 21st Century. The US Department of Defense must have the resources it needs to carry out these responsibilities.

Spectrum is one of those resources. It is crucial to the success of military operations, which inherently depend on communications and sensing. Satellite intelligence gives us precise data about situations on the ground. We avoid much harm to civilian populations if radio guided bombs precisely hit their targets. Our pilots in the air, soldiers on the ground and sailors at sea are better able to defend themselves if they have real time, effective communications capability. Effective use of spectrum enables us to put fewer American lives at risk during military

operations. The transformation of the Defense force structure into a leaner and more agile networked force depends to a large degree on access to adequate spectrum. As the strongest and most effective military worldwide, in large measure because of our use of more sophisticated and simply more spectrum-dependent systems, DoD has unique requirements for spectrum. The safety of our fighting men and women and of civilian populations is at stake.

2. Spectrum Management

Managing our national spectrum has become more important as well as more challenging as the demand for spectrum grows. The Department of Defense is committed to managing its allocated spectrum efficiently as well as to working effectively within the national and international regulatory processes to ensure access to adequate spectrum. To this end we are elevating the position of Director of Spectrum Management within the Office of the Secretary of Defense to the Deputy Assistant Secretary level and expanding and enhancing the staff to ensure that all key spectrum management functions are discharged properly. We are also studying options for improving the organization of the Department's Spectrum Management functions overall, and we will make a decision on that in the near future.

Before going into greater substantive detail, it is critical to correct a mis-impression created by certain commercial spectrum users that the Federal Government, in particular DoD, enjoys access to a generous amount of spectrum in the bands under consideration. In fact, it is important to note that of the total amount of spectrum that is generally considered appropriate for 3G deployment today, 700 MHz to 2700 MHz, the federal government is the exclusive occupant

of only about 14%.

Regarding national spectrum policy, we think it is important to strike the right balance among competing demands for spectrum, including the right balance between national security and commercial needs. We should remember that, while economic vitality contributes to national security, it is even more true that domestic prosperity depends upon adequate security. Furthermore, domestic prosperity increasingly is tied to global economic health, which depends in large measure on the international security and political stability that the US military helps to ensure.

Under the existing structure for federal spectrum management, Secretary Evans, the Department of Defense and other federal agencies and the FCC, on behalf of commercial users, are currently engaged in the search for spectrum for future commercial and governmental uses, including 3G. The existing structure is intended to ensure that the nation is making the best possible use of this precious resource and to ensure that there is adequate spectrum both for critical governmental responsibilities, including national security, safety of life and law enforcement functions, and for commercial uses. One of the challenges in managing spectrum is that the value to the nation of spectrum allocated to vital government services such as national defense and air traffic control -- "public goods" in economic terms -- is difficult to measure through market mechanisms such as spectrum auctions.

The Department is committed to doing our part in an aggressive process whereby all users of the spectrum, commercial as well as governmental, develop creative solutions to the problems of spectrum scarcity.

In our national efforts to better manage the spectrum resources of the United States, technology also is and will continue to open up new regions of spectrum such as the satellite Ka bands and laser communications. Furthermore, technology is one of the key tools for making better use of available spectrum. Spectrum-efficient technologies such as voice/data multiplexing and sideband filters should be employed wherever possible. The Department of Defense, through Defense Advanced Research Projects Agency (DARPA) programs and other activities, is pursuing advanced technologies for spectrum efficiency aggressively. We have recently received a briefing by DARPA on a "smart" frequency hopping technology that could make available unused spectrum in both government and commercial bands. Realizing the full benefits of some of the new technologies will require regulatory changes.

3. Finding Spectrum for Third Generation Wireless

The issue of finding spectrum in the United States for Third Generation Wireless ("3G") services illustrates the growing demand for spectrum in both the commercial and government sectors. The Department of Defense's needs for spectrum are growing along with those of other organizations. For example, the satellite bandwidth used in Operation Allied Force in Kosovo was two and one half times the bandwidth used in Desert Storm nine years earlier, while the Kosovo force was one tenth the size. Work done at the Department of Defense has projected significant growth in military spectrum requirements in all functional areas over the next few years (see Figure 1).

Access to adequate spectrum was critical to US Forces' success in Desert Storm and

Kosovo and will continue to be crucial to the Department's ability to transform itself into a leaner, more agile, and more effective force that can meet the security challenges of the future at reasonable cost to the taxpayers. Fundamental to this transformation is the network-centric concept of operations which is already being implemented. In this concept, all elements of a joint force are connected by a robust information network that enables common situational awareness and collaboration. Spectrum is virtually the only way to connect mobile ground forces, ships, aircraft, and satellites.

4. DoD Use of the Federal Government 1755-1850 MHz Band

As you know, the Federal government band from 1755-1850 MHz is one of the bands under consideration for 3G. DoD uses this band for satellite control, battlefield radio relay, aircrew combat training, precision weapons guidance, and many other important functions. The band was picked for these functions because the signals at these frequencies propagate in ways that make the spectrum ideal for mobile communications. Altogether more than 100 DoD systems, and a more than equal number of systems from other Federal agencies, utilize this band. Figure 2 depicts many of the uses. I will briefly describe each of the major functions resident in the 1755 MHz band.

The control uplinks for all DoD and Intelligence Community satellites (more than 120 satellites representing a cumulative investment of about $100B) use the 1755 MHz band. These satellites perform communications, positioning and timing, surveillance and reconnaissance, weather observation, and other functions crucial to warfighting and to decision-making by

National Command authorities, including the President, the Secretary of Defense, and the Chairman of the Joint Chiefs of Staff, as well as other senior military decisionmakers.

DoD's Global Positioning System satellites have become crucial parts of the national civilian/military infrastructure supporting global navigation and positioning requirements for air, land and sea vessels. GPS serves functions that are as important as the functions provided by railroads and telecommunications systems.

The battlefield radio relay systems in this band form the long-haul backbone of the Army and Marine tactical internets. They let our ground forces share situational awareness and coordinate their operations in real time across the extended battlefield, as well as to ships off-shore.

The Air Force and Navy aircrew combat training system, which provides realistic training with engagement assessment and feedback, is one of the main reasons American pilots are the best-trained combat pilots in the world.

The most accurate air-launched precision weapons in the Services' inventories are guided by data links using this Federal band. These weapons are often used by commanders to ensure the highest probability of mission accomplishment with the fewest possible civilian casualties.

Virtually all of these systems played a key role in the Allied victory in Kosovo. The success of this operation would have been unlikely without satellite-based communications, navigation, and reconnaissance, without well-trained combat aircrews, without precision-guided weapons, and without tactical radio relay systems.

Other important DoD systems that use the Federal band include Combat Identification, soldier radios, and weapon scoring.

In an era of smaller force structure, fewer people, and increased mission responsibilities, these systems provide essential training and operational capabilities. The payoff is realized in terms of mission success and force protection across the full range of US military operations from combat to peacekeeping and humanitarian operations.

I want to say in the most unequivocal way possible that the loss or degradation of our ability to perform the crucial functions that currently depend on this Federal band would have very severe consequences for national security. It would result in mission failures and increased casualties in future operations, and loss of vital intelligence information to the President and senior leaders. If 1755 MHz – 1850 MHz is to be reallocated, then other suitable spectrum must be found to enable the essential military functions to be performed without degradation, and we need enough time to relocate to the new spectrum.

5. DoD Study Findings

The White House-directed study conducted by DoD on accomodating 3G services in the Federal band examined the options of sharing the band, vacating all of the band, or vacating part of it. The study found that sharing the band between 3G services and incumbent DoD systems would not be feasible because there would be too much mutual interference. Vacating or segmenting the band is feasible in theory, provided that comparable spectrum could be allocated to DoD and adequate, timely financial compensation provided. However, the DoD

study found that DoD satellite control systems might not be able to vacate the band before 2017 and non-space systems before 2010. These timelines are driven by fact-of-life considerations including the expected satellite lifetimes, the inability to change the frequencies of on-orbit satellites and time required to design and field new systems in a different frequency band. NTIA's report incorporates the DoD findings.

6. <u>Comparable Spectrum</u>.

Let me emphasize again, as a matter of national defense and security, DoD's ability to carry out its operational mission will be jeopardized if the Department is not provided with access to spectrum with appropriate technical characteristics and regulatory protections. The National Defense Authorization Act of 2000 requires that DoD be provided "comparable spectrum" for functions displaced by reallocation of Federal spectrum to meet commercial needs. The Secretary of Defense, the Chairman of the Joint Chiefs of Staff, and the Secretary of Commerce must jointly certify that any replacement spectrum is comparable. We consider this to mean that the replacement spectrum for different DoD systems has suitable technical characteristics and similar regulatory status so that the displaced function can be performed with no degradation in essential military capability.

The process of identifying comparable spectrum is ongoing. Forced relocation of DoD without provision of equivalent spectrum will result in the very severe consequences to National Security that I addressed earlier. We will continue to work with all parties to find a way ahead on spectrum for 3G. Nonetheless, we believe that the issue of equivalent spectrum must be

resolved in tandem with the decision making process.

7. CTIA Proposals

In their 3G "briefing book," CTIA has proposed work-arounds for satellite control, tactical radio relay, and air combat training systems to enable accommodation of 3G services in the Federal band earlier than the DoD timelines. Our initial assessment is that none of these proposals could be implemented without serious degradation to DoD capabilities. CTIA has not proposed work-arounds for precision guided weapons or many other important DoD systems.

CTIA has proposed a "win-win" solution in which DoD would be provided modernization funds, beyond the marginal cost to relocate, as an inducement to accept relocation. We would be interested in seeing what could be included in such a package but have not yet seen such a proposal. Moreover, we emphasize that any such solution could only be viable if DoD is provided access to spectrum with equivalent technical characteristics and regulatory status, and if we are allowed sufficient time to relocate to the new spectrum if it can be found.

8. Need for Additional Spectrum for 3G in the United States

While the World Radiocommunication Conference of 2000 identified a need for an additional 160 MHz of spectrum for 3G, there is reasonable doubt about whether this assessment is valid for the United States and uncertainty about the timeline for meeting any

additional needs. We believe that the spectrum needs of the US wireless mobile industry should be updated and refined and timelines for such spectrum spelled out. The US has a much lower population density than Europe or Asia, so that requirements for 3G personal communications devices may be smaller than either of these regions. Further, we can expect that technological advances will enable the wireless industry to wring more use out of their spectrum (just as the DoD is counting on spectrum-efficient technologies to enable us to meet our growing needs without demanding more spectrum from the regulators). Finally, the amount of spectrum needed for 3G is undetermined because the demand for 3G services is unknown at this point. Many industry observers believe that second generation wireless services ("personal communications services" or PCS in the United States), with enhancements (high speed voice and data connection, but not streaming video) will be sufficient for most truly mobile users.

9. <u>Candidate Bands for 3G</u>

The Federal 1755 MHz band is heavily encumbered and would require nearly two decades to become available. There are other bands readily available to FCC for meeting the needs of the 3G vendors. Figure 3 lists some of the other bands available. Some of this spectrum was reallocated from DoD/Federal use to commercial use by earlier legislation and NTIA action but it has not yet been made available through auction by the FCC. Altogether there is at least 130 MHz of suitable commercial spectrum that FCC could make available this year with limited displacement to established users, and more than 240 MHz could be available within ten years.

Another means of meeting the 3G spectrum

requirement in full or in part is to provide 3G services on spectrum currently used for PCS or other wireless services, as FCC regulatory flexibility allows and as some 3G vendors are planning.

10. Harmonization

CTIA argues that the Federal band is desired for 3G because it would harmonize US spectrum allocation with 3G allocations around the world, facilitating global roaming and cost savings due to economies of scale. However, there are at least six bands that WARC-92 and WRC-00 suggested nations consider for 3G. Worldwide spectrum harmonization of 3G bands will be difficult, if not impossible, to achieve and it is generally agreed that future mobile terminals will need to be both multi-mode and multi-band to meet the global roaming requirement. Many nations are still considering which bands will be used for 3G, and I am not aware of any nation that has auctioned the 1755 MHz band for 3G. In fact, Europe uses the 1755-1850 MHz band for 2G. Europe would need to make regulatory changes before using this spectrum for 3G and probably will not migrate it to 3G for more than a decade, if ever. Many nations are waiting to see which band the US picks.

Within the 2G market today there is a lack of spectrum harmonization, but global roaming is enabled by tri-band/tri-mode terminals that are available today. In addition, the terminal and the usage costs are well within reach of most consumers. With the advent of new technology, multi-band and multi-mode terminals probably will be even cheaper to produce in the future. As a result, we believe that, not only is international wireless bands unlikely to be

achieved, but also it is not required to enable affordable global roaming.

The United States' long-standing strategy at the ITU has been to generally oppose setting of mandatory standards or allocating spectrum for specific systems within the broader service allocations. This strategy was developed to further the national interest, largely because of US policies intended to protect national sovereignty over telecommunications and to provide for market-driven innovation and competition by keeping radio services as flexible as possible. There, of course, are exceptions to this US strategy, most notably for global systems, such as the global mobile personal communications systems and global positioning systems such as GPS and Galileo. The Department has fully supported these national decisions.

At WARC-92, the United States opposed "allocation" or "reservation" of spectrum for the Future Public Land Mobile Telecommunications Systems (FPLMTS), the original name for IMT-2000. The US ultimately agreed to a compromise of only non-binding "identification of spectrum" for FPLMTS. Subsequent to WARC-92, the FCC took action to make spectrum available for PCS services that substantially overlapped with the spectrum identified for 3G. By making this decision, the FCC decided that there were national interests more important than supporting worldwide "harmonization" of wireless mobile services. There have been great benefits to US consumers from this decision since there are millions of PCS users today in the US and many other countries but, as yet, there are no commercial 3G mobile operations in the bands identified for FPLMTS by WARC-92.

Therefore, while spectrum harmonization should be considered along with other solutions to allow services to be more available and affordable to the consumer worldwide, it

should not have an overriding priority when these services can be met at an affordable cost using existing as well as future technological solutions.

11. <u>The Federal Government, including DoD, is managing spectrum judiciously</u>.

DoD is not "hoarding" spectrum nor using it inefficiently. DoD is granted access to spectrum by NTIA and, in a few cases, by FCC for specific purposes. The need for government spectrum for particular users and uses is reevaluated on an ongoing basis. DoD systems must be designed to a very high level of spectrum efficiency since the lives of servicemen and women are at risk and many military systems must operate in close proximity at the same time, during military operations. We are constantly pursuing new spectrum-efficient technologies. For example, we are fielding multiplexers for our UHF satellite receivers that multiply the number of channels per satellite by a factor of four. Moreover, we believe that the fact that some 100+ DoD systems – and systems of several other agencies, including the Departments of Justice, Agriculture, and Treasury and the National Aeronautics and Space Administration, -- make use of the 1755-1850 band for numerous important governmental functions illustrates the Federal government's efficient use of this band.

I would like to emphasize again the relative allocation of bandwidth between industry and the Federal government. Out of the total amount of spectrum that is appropriate for 3G deployment, generally 700MHz-2700MHz, the Federal government is the exclusive occupant of about 14%.

12. Conclusion

The issue of finding additional spectrum for wireless communications requires a balancing of economic and national security needs. We should remember that there can be no economic prosperity without national security. Furthermore, the value of national security cannot be measured in dollars. The benefits the nation derives from making spectrum available for Defense are expressed in terms of wars that we won't have to fight, and victories achieved and casualties avoided in the wars we do fight.

To summarize the DoD position on this issue, we must have comparable spectrum if we are to relocate, and this should be identified and certified as we make any decision to reallocate the Federal band. Forced relocation of essential military functions without comparable spectrum or without respect for the transition timelines would cause serious damage to National Security which would be reflected in increased casualties and mission failures, as well as reduced intelligence to our national and military leaders.

However, we remain open to considering a solution that genuinely benefits DoD as well as industry if such a solution can be found. The way ahead is for all of us to work together to further assess what band options are feasible and, of the feasible set, which is the best choice for 3G based on mutually-agreed criteria. This process must include an attempt to identify and certify comparable spectrum for DoD if FCC still wishes to consider the Federal band.

In conclusion, while we continue to have some serious concerns, we are confident that by working together we can achieve a long-term solution that will protect both our national security and our global leadership in commerce and technology.